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AUTHOR Warner, Anthony R.
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ABSTRACT

In a study of English auxiliary verb usage, it is proposed that this category of verbs share a characteristic that explains some idiosyncracies: they do not show morphosyntactic inflectional irregularities. According to this account, the relationship between auxiliaries and full verbs is distant, and the morphosyntactic categories that auxiliaries clearly manifest are not inflectional, as in full verbs, but instead are lexically specified. This account makes sense of the ordering of auxiliaries, the double "-ing" constraint on progressives, idiosyncratic behavior of "being" and "having," and other properties. In the context of Generalized Phrase Structure Grammar, a formulation that also constitutes a partial definition of the class "auxiliary" is proposed. This formulation operates within a system of defaults and is distinct from that of Head-Driven Phrase Structure Grammar. A 44-item bibliography is included. (MSE)

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# A Lexical Default Account of English Auxiliaries

Anthony R Warner

Department of Language and Linguistic Science
University of York

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# A LEXICAL DEFAULT ACCOUNT OF ENGLISH AUXILIARIES

Anthony R Warner

Department of Language and Linguistic Science
University of York

## Introduction

I propose that English auxiliaries share a simple property which accounts for some of their less tractable idiosyncracies. The property is just that they do not show morphosyntactic inflectional regularities. I claim that the relationship between auxiliaries and full verbs is a distant one, and in particular that the morphosyntactic categories which auxiliaries clearly manifest are not inflectional, as is the case in full verbs, but are instead lexically specified. Thus the existence of such individual items as *shall*, *been*, infinitive *have*, etc. is not predictable by virtue of inflectional rule or sub-categorial regularity, as it would be in the case of full verbs, and they may have idiosyncratic properties which are not shared by other members of the lexeme. This account makes sense of the ordering of auxiliaries, of the double-*ing* constraint on progressives, of the idiosyncratic behaviour of *being* and *having*, as well as of a series of other idiosyncratic properties. On the other hand auxiliaries clearly share a range of properties. In Warner (1992, forthcoming) I have presented an account of this redundancy within a Head-driven Phrase Structure Grammar theory of the lexicon. Here I want to explore an alternative formulation within a system of defaults adapted from that of Generalized Phrase Structure Grammar, a formulation which can equally be seen as effectively constituting a partial definition of the class 'auxiliary'. In what follows I shall briefly outline the analysis, review some of the arguments for it (there is a fuller account in Warner, forthcoming) , and present the default account.

## 1. Auxiliaries and Problems

The English auxiliaries are rather sharply defined as a group by distinctive formal properties. Central to these properties is their

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behaviour in negation, inversion and ellipsis, as illustrated by the italicized items in (1).

(1) *Could* John have written it if Mary *didn't*? - No, it *was* not written by a man.

The group includes both modal auxiliaries (principally *can*, *could*; *may*, *might*; *must*; *shall*, *should*; *will*, *would*) and non-modal auxiliaries (*be*, *have* both perfect and possessive, the 'supportive' or 'periphrastic' *do* of *Did he come?- No, he didn't come*, and the infinitive marker *to*, see Pullum 1982) The traditional formal criteria for auxiliaryhood form a well-trodden territory for which see esp. Palmer (1988: 14ff.), Huddleston (1980), Quirk et al. (1985: §3.21ff.).

The analysis of these words poses a series of longstanding problems. Here I want to focus on the following.

(i) What category do they belong to? In particular (and avoiding a polarized view of the relationship between verbs and auxiliaries), how verb-like are auxiliaries?
(ii) How is it that some of their categories are missing?
(iii) Why are they ordered as they are?
Here the last two can rather obviously be seen as two aspects of the same problem, and I will suggest that the same is in fact true of all three.

The fixed ordering is that shown in (2). Thus modals and periphrastic *do* are always first in their verbal group in Standard English, and perfect *have*, 'progressive' *be*, and 'passive' *be* do not iterate and only occur in the order of (2.b).

(2) a. The morning would have been being enjoyed.
b. modal - perfect *have* - 'progressive' *be* - 'passive' *be* - main verb

Ordering clearly interlocks with the the availability of morphosyntactic categories. If modals and periphrastic *do* only have finite categories, they cannot occur after other auxiliaries in their verbal group as in (3). Here it is apparently the restriction to finite which is primary, since

modals and periphrastic *do* are not available in other nonfinite positions, cf. (4). The same restriction affects *is to*, which is also only finite.

(3) a. *John will must leave tomorrow.
b. *John has could make some headway.
c. *Mary will do laugh at this example.
d. *Mary has done laugh at this example.

(4) a. *(For John) to must leave tomorrow .... (cf. to have to ...)
b. *John's musting leave tomorrow ....(cf. having to ...)
c. *(For John) to do laugh at this example.
d. *Mary's doing leave early is a shame

Similarly, the absence of iterated perfects and progressives, as of the progressive perfect, could be predicted from the absence of the relevant categories. Thus the failure of the perfect to iterate as in (5.a) would follow if perfect *have* lacked a past participle, and *mutatis mutandis* for (5.b, c). In these cases either ordering or the availability of categories might apparently be taken as prior. 'Passive' *be* may be different though; arguably it cannot precede 'perfect' *have* and 'progressive' *be* because they are not transitive.

(5) a. *John has had finished. *perfect + perfect
b. *Mary is having left. *progressive + perfect
c. *Paul was being singing *progressive + progressive

The problems noted above as (ii) and (iii) then are clearly interrelated, and a basic question is: What is a coherent and adequate account of these facts of ordering and availability of categories?

## 2. Previous Accounts

Approaches to these questions have been both formal and semantically based, but no convincing answer has yet been offered.

The most recent detailed account (Pollock 1989) does not discuss the problem of the mutual ordering 'of aspectual' *be* and *have*. He treats modals as restricted to initial and finite because they are generated in

finite INFL (more technically in T). But this leaves a range of questions unanswered, in particular how the restriction on *is to* might be accounted for since *is* shows agreement, and *to* is also generated within nonfinite INFL, and why it is that periphrastic *do* (which is generated in AGR) is restricted to finite.

Earlier approaches can be somewhat brutally divided up under three heads, according to the centrality of syntactic, morphological or semantic principles. Two earlier syntactic accounts are particularly important. The first is that of Akmajian, Steele and Wasow (1979) (hereafter 'ASW'). Here modals and periphrastic *do* are generated in AUX, though it is unclear why this restricts *do* in particular to finites since *to* is also generated in this position; and no account is given of the problematic *is to, ought to*. The ordering of perfect, progressive and passive depends on the presence of three distinct bar levels within VP. But there are difficulties both of justification and misgeneration, for which see Lapointe (1980b) and Gazdar, Pullum and Sag (1985: 628f.). The second important syntactic account is that offered by Gazdar, Pullum and Sag (1982) (hereafter 'GPS'). Here modals are stipulated finite in the phrase structure rule introducing them. They also give a formal account of the ordering of perfect *have* and 'progressive' *be*: syntactic conditions rule out the combinations of feature values required for the progressive participles *having* and *being*, and a perfect participle *had*. Hence the ordering facts exemplified in (5) above are imposed. Their account, however, is ultimately unconvincing because it offers no explanatory rationale or justification for setting up the analysis as it does.[1] An account along similar general lines was offered in Warner (1985). This achieved observational adequacy within an economical generalization, but it too failed to offer the more general theoretical underpinning required for plausibility.

Defectiveness has often been seen as underlying the restriction of modals to finiteness within the 'auxiliaries as main verbs' tradition. This typically morphological property is sometimes seen as supported by their irregularity: what needs to be listed may have a gap instead of an entry (McCawley 1971, 1975, and very forthrightly, Pullum and

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1 Moreover, it depends on the ad hoc adoption of particular features and further restrictions; see Warner 1985: 17 for some comments.

Wilson 1977: §3.4). The problem here is that of understanding why the gap is preserved, why what is systematic for full verbs cannot be extended to modals, and (even more remarkably) why the full paradigm of other uses of *be* and *do* is not extended to *is to*, and to periphrastic *do*. Baker (1981: 315) suggested the principle that 'partially filled paradigms in which the attested forms show a high degree of irregularity are exempted from the effect of general morphological redundancy rules.' On his account, since modals lack the third singular *-s*, they are exempted from rules forming nonfinites. But Baker does not really show that his principle is appropriate or sufficient. He refers in support to the absence of a past participle of *stride* (following Pullum and Wilson 1977): 'Given that the existing forms suffice to identify this verb as irregular, the paradigm is immune to being completed by the regular rule' (1981: 316). But here it is easy to believe that the problem is essentially morphological, since there are only seven verbs in the relevant subgroup (Quirk et al. 1985: §3.16) and alternative analogies are available (*broke - broken*). It may be indeed be that speakers have an insufficient basis here to predict a particular form. But there would be no morphological problem predicting the base form of *can* or *will*. Baker also suggests that perfect *have* lacks a past participle, thus accounting for the absence of (5.a). Here he appeals to a second principle: 'paradigms for radically different senses of the same word (possibly radically different subcategorizations) must be stated independently of one another' Baker (1981: 316). This would also be directly relevant to periphrastic *do*. But this principle seems implausible because it contradicts the position on the morpheme convincingly argued for by Aronoff (1976) that formal interrelationships may be independent of meaning, hence *stand stood: understand understood*. This would imply that Baker's principle should read 'paradigms ... *may* be stated independently of one another' and this would be insufficient.

Semantic principles have often been suggested as a plausible rationale for the ordering of aspectual *have* and *be*. For example the lack of a progressive perfect **is having* has been referred to the general absence of progressive statives, or to the general impossibility of using a perfective complement after a 'verb of temporal aspect' (McCawley 1971, Emonds 1976: 209-210; also Pullum and Wilson 1977, Iwakura 1977 for related claims). ASW: 18-20 show that the classification of *be*



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and *have* as 'verbs of temporal aspect' on which some of these accounts depended is flawed. But they raise a more essential problem for semantic accounts, that violations of semantic constraints are sometimes comparatively acceptable, unlike the the constraints on auxiliary ordering which are surely fully grammaticalized and inviolable (see ASW: 18-20, GPS: 618-619), despite Schachter's attempt to treat particular instances of violation as 'marginally tolerable' (1983: 157ff.) The most recent general semantically based account is given in Falk (1984). But what he says is inadequate, for the reasons noted in Warner (1985 note 2). Mittwoch (1988) also gives an account of the absence of the perfect progressive. But it should permit iterative interpretations with appropriate adverbials, and her account of their absence is not convincing.

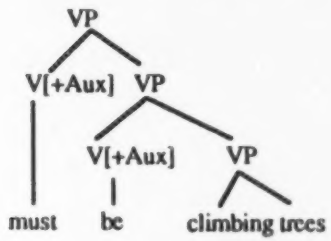
Thus there is not yet any coherent account of the ordering and categorial availability of English auxiliaries, whether based on syntactic, morphological or semantic principles. And the sharpness of these restrictions leads one to suspect that a semantic account will not be appropriate.

## 3. A New Lexical Account

I will argue (i) that the absence of particular morphosyntactic categories in auxiliaries is basic to their order, and (ii) that these absences follow from the fact that the word class 'auxiliary' is distinct in its internal morphosyntactic relationships from the class of full verbs. The occurrence of particular categories is not therefore to be automatically predicted; rather, they have the properties of listed items. Thus individual categories (which are mainly nonfinites) may be absent. Moreover, such individually specified categories may have distinct properties. In particular, they may differ in the morphosyntax they require of a following category.

In presenting this I will assume that auxiliaries (modals, *be*, and appropriate instances of *do* and *have*) are [+AUX, +V, -N], (though without great attachment to [+V, -N] which may turn out to be an irrelevancy), that they occur in structures like (6) for the reasons argued in GPS, and that they head their phrase.

(6)




Then modals are subcategorized for a plain infinitive phrase, *be* for a predicative phrase, *do* for a plain infinitive phrase which cannot be an auxiliary, etc. The analysis is much as in GPS, with the revision of Gazdar et al. (1985) that *be* is subcategorized for a predicative phrase lacking major category specification so that coordinations like (7) can be directly accounted for with an underspecified mother and more fully specified conjuncts within Sag et al's (1985) analysis of coordination. Thus 'progressive', 'passive' and predicative *be* are identified as the same category.

(7) a. I'm still expecting to go and very keen about the prospect.
b. Paul was taunted by his classmates and very angry as a consequence.
c. Paul is horribly misshapen, a creature of darkness, and thought to practice witchcraft. Please don't ask him round again.
d. The contraband was inside the wheel arch and thought to be safely hidden.

The lexicon will include the information given in (8). In (a) finite categories of modals and *do* are listed. In (b) the categories of perfect *have* are listed; note that *having* only occurs nonprogressive. In (c) are listed the categories of predicative *be* (which includes 'progressive' and 'passive' *be* as noted above). *Be* is however entered as a series of morphosyntactic categories whose subcategorizations are not all the same. I am assuming a distinction between inflectional interrelationships whose regularities lead automatically to the prediction of morphosyntactic categories, and the interrelationships of nonproductive word formation, which do not have this property. Given

this contrast my claim is that the structure of (say) *been* is akin to that of nonproductive word formation; it is a 'frozen' item, only derivatively to be analysed by the inflectional rule which predicts that verbs have past participles. This rule's proper sphere is [+V, -N, -AUX]. Hence *been* may have its own special properties, and does not have to share the subcategorization of *is*. Similarly the restriction of *is to* to finites is straightforward. I assume that 'modal' *is* should not be generalized with predicative *be*, since coordinations of *to VP* with other predicates after *be* are typically unacceptable. (When they are possible I will interpret them as zeugmatic.) Hence *is* is assigned two subcategorizations. *Being* also has a distinct subcategorization: it may not be followed by an *ing*-participle. Thus predicative, 'progressive' and 'passive' *be* are unified, but *be* is split along morphosyntactic lines.

(8) Auxiliary category and subcategorization information in the lexicon

| *Category* | *Subcategorized for a phrase headed by* |
|---|---|
| a. | |
| can, could, etc. (finite) | plain inf |
| do (finite) | non-aux plain inf |
| ought (finite) | *to* inf |
| b. | |
| has (finite) | past ptc |
| have (plain infin) | past ptc |
| having (-progressive) | past ptc |
| c. | |
| is (finite) | non-inf predicate; *to*-inf |
| be (plain infin) | non-inf predicate |
| been | non-inf predicate |
| being (±progressive) | non-inf, non-*ing* predicate |

This account most resembles earlier work by Baker (1981) and GPS (and Warner 1985 of which it is a development). It differs radically however in the nature of the underlying principles taken to control

ordering and the availability of categories, and therefore in its systematicity, which is most distinctive in its treatment of *be*.

The answers to the three questions which began this paper are then as follows.

(i) How verb-like are auxiliaries? The grammar must clearly specify for the morphosyntactic subcategories of a word class both that they typically occur, and the manner of their formation. I claim that for verbs the relevant statements are formulated as applying to V[-AUX]. If we conceive of this in terms of rules like the word formation rules of Aronoff (1976), or like the lexical redundancy rules of Jackendoff (1975), then for nonauxiliary or full verbs there is some explicit interrelating of the various morphosyntactic categories whose occurrence in the general case is thereby predicted, whether or not the lexicon is 'full entry'. But no such systematic statement is made about V[+AUX]. The morphosyntactic categories of auxiliaries simply have to be stated individually, hence the possibility of distinct properties argued for above. In support of this note how little the regular morphology of verbs applies to auxiliaries. The only fully regular combinations are *being* and *having* (on which see below). The interrelationships *do - does - did*, *have - has - had* are as much idiosyncratic as regular. If this is the best auxiliaries can do even when supported by homonymy with verbs, then it is reasonable to suggest that *be*, *do* and *have* do not show verbal inflection any more than modals do, but that they too exemplify something like nonproductive word formation, so that in so far as they are open to analysis this is a secondary, partial and nonproductive matter.

This implies that auxiliaries are distinct from full verbs in quite a fundamental way, in addition to the distinct properties noted above under (1). But it does not necessarily mean that auxiliaries are not closer to verbs than to other categories, or that they are not [+V, -N]; the nature of categorial interrelationship is complex, and polarizing such issues can be unhelpful.

(ii) How is it that some of their categories are missing? This general conundrum is immediately answered: the 'inflectional' properties or categorial regularities of auxiliaries give no basis for predicting

categories beyond those which are observed. This is a morphosyntactic property based in a word class difference. It does not therefore suffer from the problems noted for the morphologically based accounts discussed above, but can account equally for the restrictedness of *is to*, or *do*, or the absence of progressive perfect *having*, as for finiteness of modals. Thus gaps are preserved. In the case of periphrastic *do* and auxiliary *have* I suppose that forms are lexically specified and are parasitic on those of the nonauxiliary verbs in standard English; the fact that in dialect they are often uninflected is entirely in accordance with my analysis.

(iii) Why are they ordered as they are? The ordering of auxiliaries largely follows from their restricted set of morphosyntactic categories and the interaction of these with their complements.[2] Modals and periphrastic *do* must be initial in the verbal group because they are finite only. The ordering of English 'aspectual' auxiliaries is also directly and fully accounted for. Thus the absence of a progressive + perfect **is having left* follows from the absence of a progressive participle of perfect *have*, and similarly for the other restrictions of (5).

It is therefore morphosyntactic categories which are most directly ordered. Ordering has typically been thought of in terms of the lexemes and classes of lexemes involved: modals, perfect *have*, 'progressive' *be*, 'passive' *be*, as in (9.b). But (10.a) gives a more appropriate conceptualization (omitting nonprogressive *ing* forms for the moment). An auxiliary with a particular morphosyntactic category as its complement can only itself have categories which stand to the left of its complement in the list of (10.a). How it works can readily be seen from (11).[3]

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2 Together of course with the principle that ensures that the head of the complement carries the category of its mother.

3 There are three sets of facts here
(i) the requirement of each individual item that it should be followed by a specific morphosyntactic category
(ii) the availability of morphosyntactic categories of individual items, and
(iii) the ordering of morphosyntactic categories.
It is clear that either the second or the last of these is redundant, that is that (i) & (iii) ⊃ (ii), and

(9) a. The morning would have been being enjoyed.
b. modal - perfect *have* - progressive *be* - passive *be* - main verb

(10) a. finite - infinitive - past participle - progressive participle - passive participle.
b. For the morning *to have been being enjoyed* ... (infinitive - past participle - progressive participle - passive participle)
c. Paul *will be being tormented.* (finite - infinitive - progressive participle - passive participle)
d. Paul *has been tormented.* (finite - past participle - passive participle)
e. Paul *was being tormented.* (finite - progressive participle - passive participle)
f. John *would have been* miserable. (finite - infinitive - past participle)

(11) The ordering of auxiliary categories in the verbal group

| Categories of auxiliary | finite | infin | past ptc | progr ptc | pass ptc |
|---|---|---|---|---|---|
| modals | + | Compt | | | |
| *do* | + | Compt | | | |
| 'modal' *be* | + | Compt | | | |
| perfect *have* | + | + | Compt | | |
| 'progressive' *be* | + | + | + | Compt | |
| 'passive' *be* | + | + | + | + | Compt |
| copula *be* | + | + | + | + | |

Here 'Compt' (for 'complement') indicates the morphosyntactic category an auxiliary requires on a dependent verb or auxiliary, and '+' shows which morphosyntactic categories are available

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(i) & (ii) ⊃ (iii).
In Warner 1985 I took (i) and (iii) to be basic and predicted (ii). But I now believe that it is better to take (i) and (ii) to be basic and predict (iii).



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## 4. Some Further Justification

**'Double *ing*' constraint.** This account also gives us an immediate integration of the double-*ing* constraint with auxiliaries. Note that it is not only the double progressive as in (5.c) which is unavailable, but cases like (12), where *being* is not itself progressive.

(12) a. *Paul's being talking ... (cf. The fact that Paul was talking)
b. *Paul walked along, being humming as he went.
c. *The choir being singing the national anthem was cheered by the crowd (cf. The choir which was singing ...)

Thus accounts which rule out the only the double progressive, like Schachter's (1983) semantic account, or the syntactic accounts of GPS and ASW, miss a generalization.[4] It looks very much as if the required statement is a syntactic or morphosyntactic one preventing contiguous *ing*-forms within the auxiliary group, as has often been suggested. It is apparently fully grammaticized and is therefore distinct from the stylistic restriction found with other (eg. aspectual) verbs, which is frequently violated. The straightforward statement that *being* is not subcategorized for an *ing*-form has already been adopted to prevent double progressives. It generalizes directly to the more general double-*ing* constraint, which is simply another fact of the same type, fitting within the general scheme suggested here.

**Learnability.** A central problem for any account of the ordering of auxiliaries is its learnability. Why should learners restrict the ordering in the appropriate way? Under the assumptions made here it is easy to sketch an idealized account of acquisition. Learners do not generalize the availability of auxiliary categories on the model of verbs. Instead they treat the forms as individual items, and make only more cautious generalizations. Note in support of this that children do not generalize verb properties to modals, but refrain from developing inflected third singulars, infinitives, complements with the *to*-infinitive, and so forth. Now, if at whatever is the appropriate stage of development, the separate forms of *have* and *be* are treated as items

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[4] For discussion of this topic in GPS and ASW see Warner 1985: 7 note 4.

which may have distinct properties, and are assigned properties on the basis of primary data, then there will be no progressive *having*, or past participle *had* for there will be no evidence for these categories. Similarly, *be* will be permitted with *ing*-complements, but *being* will not. So no 'double *ing* constraint' is added to the grammar: the effect follows directly as a failure to generalize beyond the primary data. Thus this account provides a trivial but real answer to Baker's (1981) 'learnability problem' for auxiliary order and for the failure of morphosyntactic categories to generalize.

***Been to***. There is a curious use of the past participle *been*. In construction with a phrase implying motion or purpose it can mean (roughly) 'gone'. See OED Be, *v.* B.6.

(13) a. I have not yet been to Helsinki, though I should like to go.
b. Nor have I been over the Golden Gate bridge.

This sense is not available for other forms of *be* (although it was in earlier English). Again this implies that the generalization of lexical sense and subcategorization normal across verb forms within a lexeme (past participle, indicative, infinitive, present participle) does not automatically hold for *be*. This can be straightforwardly stated within an account in which the morphosyntactic categories of *be* are individually listed in the lexicon and permitted to have distinct properties.

***Being* and *having***. These forms, in which verbal morphosyntax most obviously does generalize, show the weakest evidence of auxiliary behaviour, and are open to analysis as nonauxiliaries. For nonfinites the only good test of auxiliary status is provided by ellipsis. In American English, however, *being* and *having* fail this test, cf. the judgements reported in Akmajian and Wasow (1975), Iwakura (1977, 1983), GPS, and elsewhere.

(14) a. *Kim is being noisy and Sandy is being, too.
b. *Kim was being watched by the FBI, and Chris was being, too.
c. *Kim's having resigned was surprising, but Lee's having came as no surprise.
(examples and judgements from GPS: 607)

The simplest account of such data is that ellipsis 'is blocked if an *ing*-form immediately precedes the deletion target' (GPS: 624, and cf. Sag 1977). This generalization will be captured if the grammar does not generate auxiliary *ing*-forms with post-auxiliary ellipsis. But now we can see a motivation for the puzzling failure of post-auxiliary ellipsis to generalize. The overt transparency of formation of *being* and *having*, together with the productive nature of *ing*-forms with nonauxiliary verbs, leads to an analysis of *being* and *having* as V[-AUX]. Hence their lack of post-auxiliary ellipsis, which is restricted to [+AUX]. This is supported by a further consideration. ASW and GPS both discuss restrictions on the 'fronting' of the complements of auxiliaries. The paradigm ASW report is one (to put it in my terms) in which a nonfinite VP headed by a nonauxiliary verb or by *being* may be fronted, but one headed by *be* or *been* may not. The main facts are recapitulated in (15.a - j), which are taken from GPS: 604, with the addition of (k - m), which are not explicitly discussed by ASW or GPS.[5]

(15) a. *and went he.
b. and go he will.
c. and going he is.
d. and gone he has.
e. and taken by Sandy he was.
f. *and to go he is.
g. *and to go he wants.
h. *and be going he will.
i. *and have gone he will.
j. and being evasive he was.
k. ?* and be happy/tortured he will.

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5 ASW claim straightforwardly that the only form of BE which may be fronted is *being* (see their 77 p. 28), though there is no explicit discussion of the crucial instances of k and l, which their analysis predicts to be ungrammatical, either here or in Akmajian and Wasow (1975). GPS's analysis makes the reverse prediction for k and l. The examples of l seem clearly ungrammatical. Those of k also seem generally unacceptable, though the judgement is not so clear. It seems best to accept the judgements implied by ASW.

l. *and been good/tortured he has.
m. and being tortured he was.

If *being* is [-AUX], then there is a straightforward generalization here: VP may be fronted provided it is not headed by an auxiliary. If *being* is [+AUX], however, a less simple and general statement seems to be necessary. Thus these two exceptional aspects of the behaviour of *being* follow straightforwardly from its analysis as [-AUX], and their acquisition and maintenance are accounted for as motivated by morphological transparency. Notice that this gives a motivated and unitary account of the two most important pieces of evidence cited by ASW in favour of their rule restructuring *be* from $V^1$ into $V^2$.[6] It also compares well with the more recent treatment of fronting data in Roberts (1990). He is forced to assign exceptional status to passive and copula *be*, which 'occupy the same V-projection as the main verb throughout the derivation. Therefore they are required to undergo [fronting] with the main verb.' (1990: 195). But as presented the analysis does not cover the facts, since it apparently treats (15.l) as grammatical, and it fails to generate the impeccable ... *and tortured he has been.*

British English is not so neatly dealt with. Here, post-auxiliary ellipsis does not fail with *being*, though for some speakers it does with *having* (GPS: 607): the type of (14.a, b) is generally acceptable, and (c) is for some. But the fronting of VP headed by *being* is grammatical as in American English. The most straightforward analysis treats *being* and *having* as [-AUX], but allows that they may occur with ellipsis, which is after all not only conditioned by auxiliaries but also by individual nonauxiliary verbs. It is, however, worth noting that there is a basis for an account of the double-*ing* constraint with such verbs as

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6 It may also provide a basis for an account of the claimed failure of stranded *being* after a fronted complement (ASW and Iwakura 1983) as in *They all said that John was being obnoxious before I arrived, and obnoxious he was being!* Note that Huddleston's (1980) reported judgements of the fronting of predicative and VP complements generally allow '[+AUX] - gap', disallow '[-AUX] - gap '. GPS, however, claim that (with appropriate stress patterns) such instances are grammatical (GPS: 630-631).



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*begin, finish*, etc. if the rejection of *ing*-complements after *being* is reinterpreted as a property of the affix. The fact that this more general constraint is apparently stronger in American English than in British English may show that British English has not so fully accepted the implications of the transparent analysis, something also implied by the ellipsis facts; perhaps then British English *being* would be better analysed as unspecified for [AUX].

## 5. A Default Account

Within the account of auxiliaries proposed above, morphosyntactic categories will simply be stated individually, hence the possibility of distinct properties argued for above. But there is also a structuring within the class which we should capture, in particular the fact that modals with their plain infinitive complement are clearly central or 'prototypical' in comparison with (say) *ought* which lacks this property. Here appropriate statement calls for default mechanisms, and I want to develop an account using a modification of the account of defaults given in Generalized Phrase Structure Grammar (GPSG, for which see principally Gazdar et al. 1985), because of its economy and elegance. Moreover this account of syntactic defaults is detailed and systematic, and it also has the virtue that it is declarative (cf. Gazdar 1987, Evans 1987). The modification of the system required is radical in that it takes an important step towards Head-driven Phrase Structure Grammar (HPSG, for which see principally Pollard and Sag 1987). But although HPSG gives an account of defaults within its lexicon I shall suggest that its structuring is not obviously appropriate for the data, which may be better illuminated by a less hierarchical account. The employment of defaults, which are essentially markedness conditions, seems fully justified by the fact that their use is ubiquitous in linguistic analyses. In particular the relatively full description of English given in Gazdar et al. (1985) required a series of default conditions, and it is difficult to imagine that linguistically satisfactory analyses of natural language will be achieved without such conditions.

### 5.1 Morphosyntactic Features

I will adopt the feature analysis for verbal morphosyntax argued for in Warner (1985). This depended on two conservative criteria. First, that

such logical operations as disjunction, negation and quantification are not available within categories, though disjunction at least may feature in the statements about categories made in lexical entries. Second, that it is better to adopt syntactic features which correspond directly to morphological categories where this is possible. This might be defended on grounds of simplicity, or of learnability. Note that the first of these criteria is inconsistent with the characterization of the finite/nonfinite/participial parameter by means of a feature name VFORM with the values {FIN, BSE, INF, PSP, PRP, PAS} as in Gazdar et al. (1985) or Pollard and Sag (1987) given that it is necessary to characterize the complement of *being* in such a way as to bar infinitives and *ing*-forms, even in a coordination of complements.

**Participles and gerunds.** Given the second criterion just proposed, we may suppose that present participles and gerunds share a feature [+ING], and that past and passive participles, which always show the same morphology in English, share a feature [+EN]. These categories can be subdivided by the single feature PRD, which characterizes the 'predicative/non-predicative' distinction in Gazdar et al. (1985), Pollard and Sag (1987: 64ff.). This is sufficient to distinguish the past participle [+EN, -PRD] from the passive participle [+EN, +PRD], and a feature PASSIVE is not necessary. It also distinguishes progressive and nonprogressive *ing*-phrases, as is appropriate given their distinct distribution. But there seems to be no need to suppose any further lexical level distinction (say between 'gerund' and 'participle') among *ing*-forms with verbal rection.

The distinctions proposed so far, then, are these:

| | |
|---|---|
| Nonprogressive *ing* | [+ING, -PRD] |
| Progressive *ing* | [+ING, +PRD] |
| Past participle | [+EN, -PRD] |
| Passive participle | [+EN, +PRD] |

**Finites and infinitives.** It is natural to assume a feature FIN 'finite', and I will assume with GPS that the 'bare' infinitive (the infinitive without *to*) is distinguished by a feature BSE, both having values {+, -}. Imperatives conjoin with finites, and are distinct from infinitives in negation and in that their subject is not oblique. They are

clearly [+FIN], but must be distinguished from other finites. If they are analysed as [+FIN, +BSE] this will capture the fact that they are always the base form of the verb, even with the highly irregular *be*, in accordance with the criterion suggested above.

The bare infinitive is taken to be [-FIN, +BSE]. I follow Pullum (1982) in taking *to* to be an auxiliary verb, and I will characterize it by a feature TO with values {+, -} so that *to* is itself a base form, [-FIN, +BSE, +TO].

The distinctions proposed for finites and infinitives are these.

| | |
|---|---|
| Nonimperative finite | [+FIN, -BSE] |
| Imperative | [+FIN, +BSE] |
| Bare infinitive | [-FIN, +BSE, -TO] |
| *To* infinitive | [-FIN, +BSE, +TO] |

Using this set of morphosyntactic features, a reasonably full lexicon for English will include the information of (16).[7] Note the special subcategorization for *been* in the sense 'go', and the restriction of *have to*, and possessive *have* to finites as I believe is appropriate for some speakers. In this fuller account the fact that the subcategorizational properties of the different categories of *be* and *have* may be distinct is clearer than in the abbreviated account of (8) above.

(16) Auxiliary category and subcategorization information in the lexicon

| *Form* | *Subcategorized for phrasal complement* |
|---|---|
| can, could, etc. [+AUX, +FIN, -BSE] | [-FIN, +BSE, -TO] |
| do [+AUX, +FIN, -BSE] | [-FIN, +BSE, -TO, -AUX] |
| ought [+AUX, +FIN, -BSE] | [-FIN, +BSE, +TO] |
| to [+AUX, +BSE, -FIN] | [-FIN, +BSE, -TO] |
| is [+AUX, +FIN, -BSE] | [+PRD, -BSE];<br>[-FIN, +BSE, +TO, -PRD] |

7 Here I assume a transparent feature DIR which encodes the directionality of the complement of *been*. Identificational *be* is not represented.

| | |
|---|---|
| be [+AUX, +BSE] | [+PRD, -BSE] |
| been [+AUX, +EN, -PRD] | [+PRD, -BSE]; PP[DIR] |
| being [-AUX, +ING] | [+PRD, -BSE, -ING] |
| has [+AUX, +FIN, -BSE] | [+EN, -PRD]; NP; [-FIN, +BSE, +TO] |
| have [+AUX, +BSE] | [+EN, -PRD] |
| having [-AUX, +ING, -PRD] | [+EN, -PRD] |

**5.2 Subcategorization**

GPSG treats subcategorization as a syntactic condition, not one to be reduced to theta role assignment or functional or semantic selectional restriction. For convincing arguments for this position see Sag and Pollard (1989). GPSG makes use of a battery of syntactic rules to define phrase structure, and introduces lexical items by coding them for the particular rule which introduces the items they are subcategorized for. Thus in Gazdar et al. (1985) periphrastic *do* is SUBCAT[46] and is introduced by this Immediate Dominance rule, which gives its subcategorization for a plain, nonauxiliary infinitive.

(17) VP[+AUX] → H[SUBCAT[46]], VP[-AUX, BSE] (where 'H' identifies the rule's head, BSE the plain infinitive)

GPSG also deals with relationships between constructions (such as active - passive) indirectly, by 'metarules' which define further syntactic rules on the basis of those already in the grammar. But this theory of metarules needs revision on several counts (Pollard 1985). The most striking is the fact that metarules have to be restricted so as to interrelate only syntactic rules which introduce lexical heads (Gazdar et al 1985: 59). This is important in capturing restrictions on the distribution of traces, which can only appear as sisters to lexical heads (Flickinger 1983). But as a restriction on metarules this is quite unmotivated; it is not a consequence of the architecture of the grammar as would be desirable. It means that metarules essentially interrelate subcategorization possibilities, which suggests that GPSG's syntactic account of subcategorization should be replaced by a lexical account,

and that this area of syntax is a projection from the lexicon with metarules reinterpreted as lexical rules.[8] This in turn suggests that subcategorization facts should be encoded directly in lexical entries. This is done in HPSG where *do* is specified SUBCAT <VP[BSE], XP> in the version of the theory developed by Pollard and Sag (1987: 204) in which the value of SUBCAT is a list of categories specifying both subject (here [XP]) and complements in reverse order. This permits a radical reduction in the number of rules which define syntactic dominance within the theory, since the information on the right hand side of rule (17) and the major category of its mother is in the lexical entry, and Pollard and Sag in fact capture all lexical-head + complement structures by means of two very general rule schemata.

### 5.3 Default Conditions and the Lexicon

We might consider adopting a reformulation of GPSG under which lexical items were specified for their complements in a list-valued feature SUBCAT, and the grammaticality of a local tree which contained a head and its complements depended on a matching of these categories (via a schematic rule) with those in a lexical entry: the head with the lexeme, and the complements with categories in the lexeme's SUBCAT feature.[9] The feature and category system would be that of GPSG adding list-valued features within the general framework of Gazdar et multi al. (1986). Metarules would be replaced by lexical redundancy rules. There would of course be a series of redefinitions, some of which are noted below. For my present purposes what would be interesting about this system is the prospect of capturing much lexical redundancy by stating lexical entries in an underspecified form and allowing the instantiation of features within the lexicon to yield

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8 There is also a problem over the generative capacity of a theory with metarules: their availability must be restricted to avoid increasing expressive power, but it is not clear that the restriction imposed by Gazdar et al. 1985 (that a metarule should not be allowed to apply to its own output) is either natural or descriptively appropriate. For some other problems see Jacobson 1987: 395-7, tempered by Hukari and Levine 1990.

9 I shall not consider the status of subjects, and my SUBCAT values will refer only to complements.

fully specified entries under the control of specific conditions, both absolute and default, along the lines of those in GPSG.

This would provide an alternative to the HPSG system. In this system lexical entries are fully (or nearly fully) specified and redundancy is reduced by lexical redundancy rules and by inheritance within a structured network of information (Flickinger 1987, Pollard and Sag 1987: chapter 8). On the face of it the GPSG defaults give a system which lacks the hierarchical structuring of Pollard and Sag's typed account, though hierarchy can be represented in it. This apparent difference (even advantage) will be discussed briefly below.

In the theory of categories developed in GPSG, categories consist of 'feature name - feature value' matrices, and their occurrence in trees is subject to two particular type of restriction:

(i) Feature Cooccurrence Restrictions, which are absolute. For example AGR (agreement) in English is found only on [+V, -N] (1985: 246)

(ii) Feature Cooccurrence Defaults, which hold whenever no contrary statement has priority. For example, lexical verbs are not passive (unless of course they are specified as such by metarule) (1985: 100). Otherwise the grammar would falsely predict the grammaticality of such passive VPs as *bitten a dog*, hence of the sentence *John was bitten a dog*, etc.

Now, although Feature Cooccurrence Defaults are part of the mechanism of syntactic specification in GPSG, it is clear that at least those which involve lexical items can equally be interpreted as holding within the lexicon in a model in which feature specification takes place in the lexicon. The reason for this is as follows. The default system of GPSG holds for both phrasal and lexical nodes. In the case of phrasal nodes there is an elaborate mechanism for exemption from default conditions where information is being transmitted to another node within the local tree. But, if we accept the simplification of the default system proposed in Warner (1987) (as I do), then there is no such exemption in the case of lexical nodes. Thus there is no need to refer to syntactic information here. These conditions could apply in the lexicon,

and the most constrained theory would indeed be one that required them to apply where distinctively syntactic information was not available, i.e. in the lexicon. Instead of being defined across 'projections' of rules they could be defined across 'projections' of minimally specified lexical entries in a very straightforward reworking of the GPSG definition.[10] It is also straightforward to suppose that those Feature Cooccurrence Restrictions relevant to the lexicon may hold within it (as well as more generally within the grammar).

Moreover, it may be possible to generalize this position to phrasal defaults. The GPSG default system has the effect that phrasal defaults apply when the value of the default feature does not covary with that of some feature in another category within a local tree. Thus the default to [-INV] (where clauses with subject-auxiliary inversion are [+INV]) does not hold on a root S, since the value of INV covaries with that of a head daughter. But there is typically no covariation when a phrase is introduced as a subcategorizand, and complement clauses therefore default to [-INV]. This would clearly follow if defaults held within the value of SUBCAT in the lexicon. Moreover, there would be an interesting advantage, because the effects of the exemption mechanism proposed in Gazdar et al. (1985) would follow as a theorem, without the need to specify any mechanism for that exemption. Intermediate nodes would simply not be subject to the default in the first place, and would need no exemption. Thus there would be a motivated account of the scope of defaults which is ad hoc and has no apparent rationale from the point of view of GPSG. Needless to say, this would be a highly desirable position.[11]

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10 Instead of referring to the 'candidate projections' of a rule (Gazdar et al. 1985: 102-103), the definition of defaults will refer to 'candidate projections' of an under-instantiated lexical category.

11 If all defaults are lexical, however, the analysis of coordination proposed in Sag et al. 1985 may need to be abandoned. In this proposal the constituent coordination of nonidentical constituents is analysed as having the mother unspecified for those features whose values differ between daughters. But this implies that some phrasal defaults will have to occur in the syntax within coordinate structures, cf. for example *I expect to see Harry and that he will be pleased to see me* where a default requiring infinitives to be introduced by *to* cannot apply within SUBCAT since SUBCAT won't be specified for the infinitive. Related difficulties with lexical level categories

**5.4 Lexical conditions on auxiliaries.**

We can conceive of subregularities within the category structure of a lexeme in two broad ways. In one, rules of formation specify the existence of a subcategory and its shape. The other dissociates the morphological statement from the syntactic categorial statement, as if one were to say, 'verbs have progressive participles' without also treating of the question of their regular formation. The statements made in this section structure the interrelationship between verb and auxiliary and the subcategories of auxiliary in this second way, without reference to the morphological formations involved. In the first half of this paper I did not draw this distinction. But the separation of the two levels of statement has the advantage that it explicitly rules out the otherwise potential association of irregular syntactic properties with morphologically irregular forms. Thus a participial noun is surely impossible in English, even as an irregular formation.

The relevant statements are briefly made. Here V stands for the feature complex common to verbs and auxiliaries, [+V, -N].

(i) Feature Cooccurrence Restrictions

+FIN ⊃ V
+BSE ⊃ V
+EN ⊃ V
+ING ⊃ V

These require any category which is [+BSE] (etc.) to be also V. These restrictions (and the defaults below) form part of the grammar's account of what the permitted morphosyntactic categories of the word classes in question are. For English verbs we need (for example) to say that they

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will be met if a sufficient degree of morphosyntactic specification is imposed by Feature Cooccurrence Restriction (such as V, BAR 0 ⊃ FIN, BSE, etc.) as seems not implausible. Proudian and Goddeau 1987 propose a variant account of coordination within HPSG which registers conflict of feature values on the mother. But as stated this misgenerates badly, and would apparently predict *I expect see Harry and that he will be pleased to see me*, *I expect seeing Harry and that he will be pleased to see me*, etc. given their use of VFORM and of [VFORM CONFL] (mnemonic for 'conflict').

have a plural present indicative finite and a progressive participle. If the specification of features on categories is free but subject to conditions, Feature Cooccurrence Restrictions can be seen as structuring the category space of a language. Thus, one rendition of +EN ⊃ V into English would be as 'only verbs have second participles' (to borrow Jespersen's term). This is not the same statement as would be made by a morphological rule which allowed for the regular formation of second participles only of verbs, since it debars 'irregular' second participles of nouns and other parts of speech and thus structures the language's category space as the morphological rule does not.

(ii) Feature Specification Defaults

1 a. +BSE ⊃ -AUX
  b. +EN ⊃ -AUX
  c. +ING ⊃ -AUX
  d. +PRD ⊃ -AUX

2 a. +AUX ⊃ SUBCAT<[+BSE]>
  b. +AUX ⊃ SUBCAT<[-TO]>

3 +AUX, SUBCAT<[+BSE]> ⊃ +FIN, -BSE

Default statements also form part of the grammar's account of the normally permitted morphosyntactic categories of a word classes. But they admit exceptionality as a special property of an item or group of items, as we must do if general statements of any interest are to be made. They also have the particular appropriacy and interest that they permit us to model the prototypicality structuring of a word class. It seems clear that modals are prototypical auxiliaries, and that nonfinite morphosyntactic categories of the verb do not automatically apply to auxiliaries, from which we might conclude that nonfinite auxiliaries were less prototypical within the class. The first set of defaults above simply state that nonfinite morphosyntactic categories of the verb, including [+PRD] (which is never [+FIN]), are not freely available to auxiliaries. They require any category which is [+BSE] (etc.) to be also [-AUX], unless the grammar specifies otherwise. The consequence of

these statements is that fully specified auxiliaries will all be [-BSE], etc. unless some further statement is made. The defaults of (2) say that prototypical auxiliaries take a plain infinitive phrase: modals belong here. The default of (3) seems also to be necessary, although its effects overlap with those of the first set. It says that an auxiliary with an infinitival complement is indicative (i.e. a nonimperative finite). This statement might rather be taken as a Feature Cooccurrence Restriction, i.e. as exceptionless: its status depends on the analysis of the nonfinite forms of *dare*, and of imperative *do*. It is worth noting that this default imposes the order 'finite - infinitive' of (11) on the verbal group.

This more detailed attempt to extract the regularities within the class of auxiliaries which characterizes modals as its prototypical members also enables us to refine the rather general statement made in the first half of the paper about the relationship between verbal categories and auxiliaries. Within a default account the status of finiteness is distinct from that of nonfiniteness. But there is no regularity of formation related to that of full verbs either in morphology or in semantics, as I argue in Warner (forthcoming). If the default account given here and the generalizations I have stated within it are appropriate, the following more complex characterization of the morphosyntactic relationship of auxiliaries and full verbs seems reasonable.

(18) The inflectional regularities of verbs do not hold for auxiliaries; nor do auxiliaries automatically have any nonindicative categories. But the unmarked auxiliary is indicative.

Given the Feature Cooccurrence Restrictions and Feature Specification Defaults above, with these additions:

FCR: TO ⊃ +BSE
FSD: SUBCAT ⊃ SUBCAT<[BAR 2]>
FSD: SUBCAT ⊃ SUBCAT<[-PRD]>



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the (underspecified) lexicon for auxiliaries can be simply listed.[12] Note that only the [+AUX] category membership of a central modal need be given.

(19) Auxiliary category and subcategorization information in the lexicon before application of defaults.

| | |
|---|---|
| can, could, etc. | +AUX |
| do | +AUX, SUBCAT<[-AUX]> |
| ought | +AUX, SUBCAT<[+TO]> |
| to | +AUX, +BSE, -FIN |
| is (finite) | +AUX, SUBCAT<[+PRD, +TO]> |
| is (finite) | +AUX, SUBCAT<[+PRD, -BSE]> |
| be (base) | +AUX, +BSE, SUBCAT<[+PRD, -BSE]> |
| been | +AUX, +EN, SUBCAT<[+PRD, -BSE]> |
| been | +AUX, +EN, SUBCAT<[DIR]> |
| being (±progressive) | -AUX, (+PRD), SUBCAT<[+PRD, -BSE, -ING]> |
| hes (finite) | +AUX, SUBCAT<[+EN]> |
| has (finite) | +AUX, SUBCAT<[+TO]> |
| has (finite) | +AUX, SUBCAT<[N]> |
| have (base) | +AUX, +BSE, SUBCAT<[+EN]> |
| having (-progressive) | -AUX, +ING, SUBCAT<[+EN]> |

## 6. Why this formalism?

I have proposed here an account of lexical defaults which is apparently distinct from that of HPSG. Overt differences between the two kinds of account may turn out to be of no great importance, since it is clear that major aspects of frame inheritance systems and typed systems can be represented in logical formalism, even if the claim made by Hayes (1980: 56) that 'most of "frames" is just a new syntax for parts of first order logic' has not been generally accepted (Ringland and Duce 1988: 92). But the accounts are at least intuitively of different kinds.

12 Here for simplicity I omit *have got* and identificational *be*

I suggested above that auxiliaries are characterized by these Feature Specification Defaults

2 a. +AUX ⊃ SUBCAT<[+BSE]>
b. +AUX ⊃ SUBCAT<[-TO]>
3 +AUX, SUBCAT<[+BSE]> ⊃ +FIN, -BSE

('an auxiliary is subcategorized for a plain infinitive; if an auxiliary is subcategorized for an infinitive it is nonimperative finite'). If this is right, the subcategorization SUBCAT<[+BSE]> makes a complex contribution to the structuring of auxiliaries. A typed hierarchy might assign [+AUX, +FIN, -BSE, SUBCAT<[+BSE]>] to a type 'auxiliary'. But this would obliterate the status of the one-way implicational structuring. And it is not easy to see how just the complex of information of (2) and (3) would be appropriately and naturally represented by means of inheritance in an inheritance hierarchy. A related point is as follows. In the Feature Specification Defaults above [+AUX] can be viewed partly as an abbreviation for other auxiliary properties not explicitly listed, such as the existence of pro-verbal uses, or the availability of a negative inflection. In accounts of prototype structuring, it is natural to assume that properties interact in the sense that clusters of properties are more potent than the sum of their individual contributions (cf. Tversky 1977), and this is what is represented in Feature Specification Default 3. But this kind of structuring is not obviously hierarchical in the sense of Flickinger's account of the HPSG lexicon (1987).

So I have two related and partly intuitive reasons for suspecting that a lexical (or word class) hierarchy of inheritance may not be an appropriate framework for stating all linguistic redundancies between classes. Clearly I haven't demonstrated anything here. I've just underpinned my suspicions that a lexical class hierarchy isn't the end of the story. But this makes it worth exploring an alternative.

## 7 Conclusions

(i) English auxiliaries are categorially distant from full verbs. In particular, the regularities of verbal morphosyntax which predict the existence of a paradigm of categories and their formal attributes do not

hold for auxiliaries. Their categories are given separate statement and may have separate properties, including subcategorization. This has been shown to give a detailed account of the puzzles of auxiliary order, the double-*ing* constraint, the idiosyncratic behaviour of *being* and *having* as well as of some other characteristics. Thus a series of long-term problems has been very simply interpreted in terms of a plausible type of word-class difference.

(ii) The default conditions of GPSG can reasonably be reinterpreted as holding in the lexicon.

(iii) The class of auxiliaries can be very simply and straightforwardly described as structured in terms of a series of defaults.

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